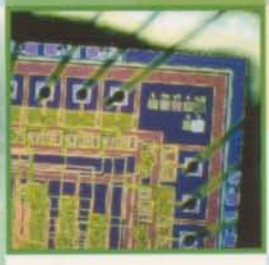
BUILDING TECHNOLOGICAL CAPABILITY IN THAILAND'S SMEs



สวทช
NSTDA

NATIONAL SCIENCE AND TECHNOLOGY DEVELOPMENT AGENCY

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สวทช
NSTDA
สำนักงานพัฒนาวิทยาศาสตร์และเทคโนโลยีแห่งชาติ
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INTRODUCTION

This booklet explains the National Science and Technology Development Agency's (NSTDA) commitment to the development of science and technology in Thailand in support of national economic and social policies.

For years, NSTDA has played an important role in supporting Thai industry by providing both technical and financial assistance to promote the upgrading of technology, to promote the research and development of new products and processes, and to raise production standards for competitiveness and sustainable development. Its Department of Industrial and Techno-Business Development has delivered the Industrial Consultancy Service (ICS) and the Science and Technology Acquisition and Mastery Program (STAMP). Industry support is also offered through Standards, Testing and Quality Control (STQC), the Intellectual Property Service (IPS), the Company Directed Technology Development Program (CD) and through the work of the Research and Development Certification Committee (RDC).

NSTDA is well aware of the fact that most economic growth comes from small- and medium-sized enterprises (SMEs) and that in order to accelerate the technology development of Thai SMEs it is necessary to improve its own capability in supporting those organizations. To achieve this, NSTDA has set out to be much more accessible to SMEs in terms of geography and relative levels of science and technology.

In achieving this accessibility, NSTDA has established the Industrial Technology Assistance Program (ITAP) as an integral part of, and a core element within, its mandate and strategic directions. As an integrated organization, NSTDA's research centers, ITAP, and other support groups, act in concert in formulating strategic priorities that serve the needs of SMEs.

CURRENT ACHIEVEMENTS

The following activity reports highlight the achievements of various groups within NSTDA in their traditional role as supporters of Thailand's SMEs. The reporting groups are:

ITAP Industrial Technology Assistance Program

STQC Standards, Testing and Quality Control

STAMP Support for Technology Acquisition and Mastery Program

CD Company Directed Technology Development Program

IPS Intellectual Property Service

RDC Research and Development Certification Committee

ITAP - Industrial Technology Assistance Program

The National Science and Technology Development Agency (NSTDA) has established the Industrial Technology Assistance Program (ITAP) with a mandate to stimulate the economic growth of Thailand through technological innovation. ITAP's vision is that it will become the national technology support program for SMEs to help them meet the challenges they face in introducing technology-based products and processes.

Although ITAP has been operating since 2001, it is now undergoing a major restructuring with collaborative support from the National Research Council of Canada.

ITAP objectives are as follows:

- To promote and support the development of SME technological capability.
- To provide knowledge-based innovation assistance to SMEs.
- To provide national network access to strategic resources for the support of SME innovation activities.
- To promote the use of Thai expertise to address the technology needs of SMEs
- To further develop international linkages that offer technology-based opportunities for SMEs.

Technical Services (Offered at present)

- Diagnosis of preliminary technical problems by experts.
- Identification of experts, both local and overseas, to solve technical problems as well as assist in production development which may include technology management but not administration and marketing.

Financial Assistance

- For preliminary problem diagnosis: Baht 3,000 per day for 2 days per case.
- For problem solving or technology development: up to 50% of the cost of consultancy projects to a maximum of Baht 500,000.

Eligible Companies

For any SME to be eligible for ITAP support it must:

- be registered and manufacturing in Thailand;
- have at least 51% Thai ownership;

- demonstrate a strong interest in, and potential for, improving its technological innovation capacity.

Achievements

Since 1992, ITAP (initially under the name of its predecessor ICS) has contacted over 4,000 companies and provided problem investigation and analysis services to 840 companies. ITAP has also supported 312 consultancy projects with a total project value of approximately Baht 80 million (comprising NSTDA support of Baht 35 million and private sector investment of Baht 45 million).

ITAP's SME project statistics are shown in the table below:

	Projects		
Fiscal Year	Applications	Preliminary	Long Term Consulting
1992	8	3	2
1993	16	5	5
1994	13	3	4
1995	30	18	9
1996	36	3	12
1997	133	95	23
1998	97	27	39
1999	64	41	39
2000	72	44	43
2001	93	45	75
2002 (May)	82	41	61
TOTAL	**644**	**325**	**312**

STQC - Standards, Testing and Quality Control

Summary

The main purpose of STQC activities is to strengthen the international competitiveness of Thailand by providing various types of support in the areas of quality management and metrology to Thai industry. STQC activities include human resource development, services, research and development and financial support.

Human Resource Development

STQC has provided public and in-company training to over 8,000 persons in approximately 2,000 public and private organizations.

Services

STQC provides ISO 9000 consultancy services that include full consultancy and spot consultancy services. Assigned personnel from STQC provide the full consultancy service through the ISO 9000 implementation process. The spot consultancy service covers services such as baseline evaluations and pre-assessments and is provided according to requests from clients. Fifty-one organizations have made use of STQC consultancy services. There are also seventy Thai SMEs implementing the Thai Foundation Quality System (TFQS) - the first entry-level system for SMEs in Thailand. STQC has established a database on quality issues that has been used 1,673 times from 1995 to 2002.

Research and Development

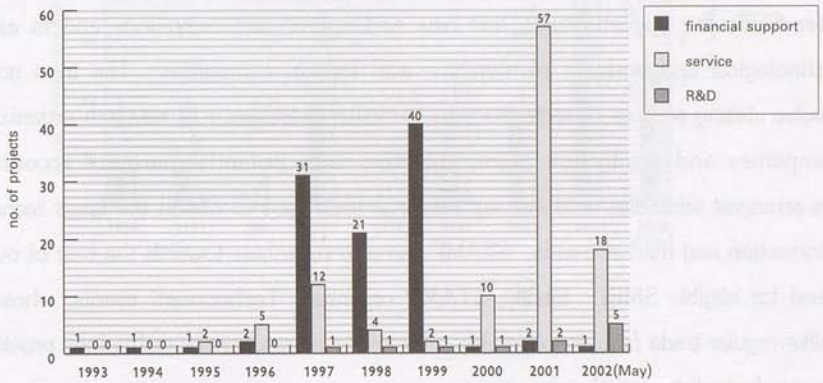
STQC Research and Development activities are crucial and STQC was the first organization to initiate a research project to develop the Thai Foundation Quality System (TFQS) for SMEs. TFQS is aimed at companies that are not ready for ISO 9000 due to the complexity and the cost of the ISO standard. TFQS has been successfully implemented in nine companies. STQC currently conducts the research on the critical success factors necessary for a company to move from TFQS to ISO 9000 and Total Quality Management (TQM). There are seven companies involved in this project. STQC is also currently conducting quality management research in TQM with 5 companies.

Financial Support

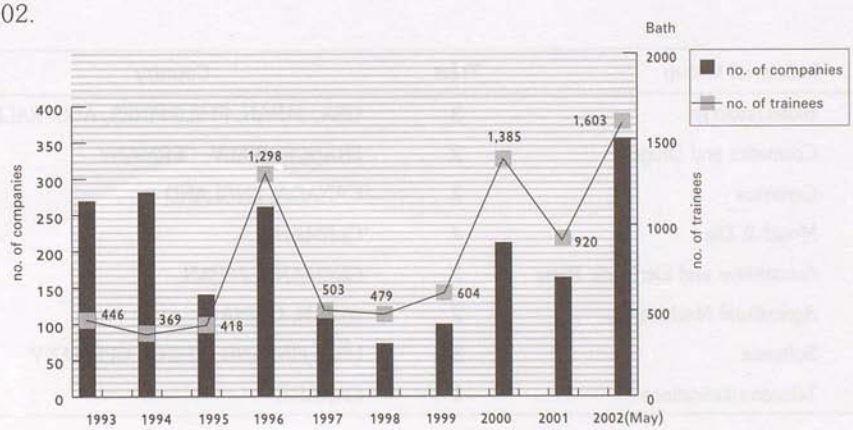
STQC provides financial support for various activities. The main activity between 1997 and 1999 was to provide funding to private companies to assist with the implementation of ISO 9000. In 1997, NSTDA was the first public organization to motivate Thai industry by providing financial support - 88 companies were supported and 66 have been successfully certified. STQC also provides financial support to the Metrology Society of Thailand. In March 2000, the Center for Industrial Instrument Calibration was established at King Mongkut's University of Technology Thonburi (KMUTT) to provide calibration services to Thai industry.

STQC collaborated with the Thailand Productivity Institute to set up a National Quality Award (NQA). In order to promote improved quality management in Thailand, STQC also serves as the secretariat office to conduct the 2nd and 3rd symposia on TQM best practices in Thailand in 2001 and 2002.

The following graph shows STQC support activities from 1993 to 2002.



The graph below shows STQC's human resource development activities from 1993 to 2002.



STAMP - Support for Technology Acquisition and Mastery Program

In this age of innovation and change, many Thai companies are beginning to see the benefits of using technology to keep their businesses competitive and up-to-date with the latest technologies in their field. They have to conduct their business activities in a dynamic business environment with strong competition in both domestic and international markets. To survive and grow in the global market, the innovative application of technology is an important tool to increase a company's capability and strengthen industrial competitiveness.

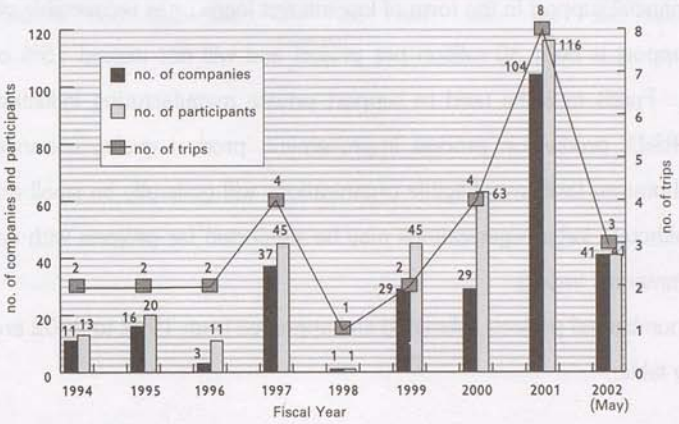
As one of NSTDA's private sector support programs, STAMP facilitates the process of searching for, and acquiring, appropriate technology. STAMP provides Thai SMEs with the opportunity to obtain first-hand information on technological advancements and innovations in today's world. It also provides SMEs with visions of tomorrow for their future technological and business development. This is done by arranging overseas technology trips and organizing in-bound and out-bound matchmaking events. These activities offer SMEs the opportunity to find new and appropriate technology and to establish technological and business partnerships with foreign companies. The trips normally involve visiting sources of technology in particular fields, such as research organizations, companies and production plants, meeting with potential partners according to pre-arranged schedules, and visiting industrial trade fairs to obtain the latest technology information and market trends. STAMP can also contribute towards the cost of overseas travel for eligible SMEs. Finally, STAMP organizes "Technomart" events, whose role, unlike regular trade fairs, is to provide a forum for researchers or technology providers to meet industrialists or technology users.

Since 1994, STAMP has arranged 28 overseas technology trips with 271 companies. Examples of the trips are shown in the table below.

Industrial Group	Trips	Country
Biotechnology	3	USA, JAPAN, PHILIPPINES, AUSTRALIA
Cosmetics and Drugs	2	FRANCE, ITALY, GERMANY
Ceramics	2	CANADA, ENGLAND
Mould & Die	4	GERMANY
Automotive and Electronic Parts	3	GERMANY, JAPAN
Agricultural Machinery	2	JAPAN, CHINA
Software	3	USA, FINLAND, CHINA, GERMANY
Telecommunications	1	CANADA

To facilitate technology transfer, business co-operation, and discussion between Thai and foreign companies, STAMP collaborated with Canada's National Research Council (NRC) to organize a business and technology matchmaking event in Thailand for Thai and Canadian companies. This event took place in May 2001 and featured industrial groups from the information technology, communications, telecommunications and software sectors. One-on-one, pre-arranged meetings involving 86 partners were arranged for 13 Canadian companies and 35 Thai companies.

The graph below shows STAMP activity, on behalf of Thai SMEs, from 1994 to 2002.



CD - Company Directed Technology Development Program

With the current increasing competition resulting from the General Agreement on Tariffs and Trade (GATT), the coalition of economic zones such as the ASEAN Free Trade Area (AFTA) and the agreement on intellectual properties, Thailand needs to prepare for competition in the future world market. Research and Development (R&D) in scientific and technical areas is an important factor in this preparation.

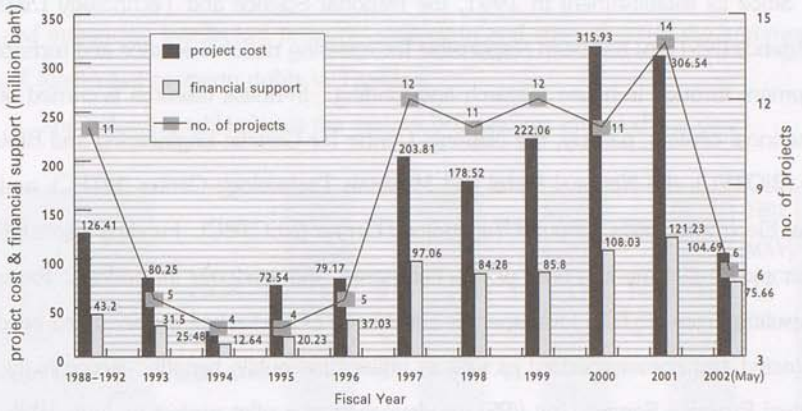
Financial support is one strategy to encourage the private sector to invest in R&D. This has been the case with the National Science and Technology Development Agency (NSTDA) that established the Company Directed Technology Development Program (CD) to provide financial support in the form of low-interest loans or as recoverable grants. The maximum support is Baht 30 million per project and will not exceed 75% of the total project cost. Funds must be used to support private manufacturing industries that are involved in R&D, production process improvement, product quality enhancement and setting up laboratory facilities. Eligible organizations will generally be small and medium enterprises although large organizations may be supported for projects with considerable potential commercial impact.

The numbers of projects submitted and approved from 1992 to 2002 are shown in the following table.

	Projects Submitted			Projects Approved				
Year	Loan	Grant	Total	Loan	Grant	Total	Project Cost (million baht)	CD Support (million baht)
1992-2000	152	67	219	58	17	75	1,304	520
2001-2002	34	0	34	20	0	20	411	197
TOTAL	**186**	**67**	**253**	**78**	**17**	**95**	**1,715**	**717**

Note: The Recoverable Grant program was removed from CD management control in the 2002 fiscal year.

The graph below shows the number and value of CD projects from 1992 to 2002.



IPS - Intellectual Property Service

Since its establishment in 1991, the National Science and Technology Development Agency (NSTDA) has been responsible for fostering national science and technology development through in-house research and funding. In-house research is carried out in three national centers, namely, the National Center for Genetic Engineering and Biotechnology (BIOTEC), the National Metal and Materials Technology Center (MTEC), and the National Electronics and Computer Technology Center (NECTEC). Funding also supports research and development in both private companies and academic institutions. Research work resulting from NSTDA investment is considered as intellectual property and needs to be protected and commercialized as well as utilized for public benefit. Accordingly, the Intellectual Property Service Unit (IPS) was launched as a pilot project in June 1995 and was officially established in December 1997. The main objectives of IPS are to establish principles and guidance for intellectual property protection at NSTDA; to provide services with regard to intellectual property protection; to promote the commercialization of research results; to support and enhance the commercial usage and management of intellectual property rights as information sources and technology transfer. This latter objective is required to improve the efficiency and competitiveness of business and technology in both domestic and international trade.

IPS offers varied services such as the preparation of applications relating to intellectual property protection, the preparation of agreements regarding intellectual property rights, and the provision of legal advice concerning intellectual property rights and technology transfer as well as patent information searching. The services are available to public and private sectors. IPS has processed 89 patent applications - 87 national patent applications and 2 international patent applications. Seven patent applications have been granted. In addition to patent applications, IPS has filed one application for integrated circuit layout design, notified 24 copyrighted works as well as processed 36 trademark/servicemark applications at the Department of Intellectual Property. IPS has also undertaken 85 patent searches for researchers and related persons. Furthermore, IPS has organized 13 seminars relating to intellectual property topics involving over 1,600 participants.

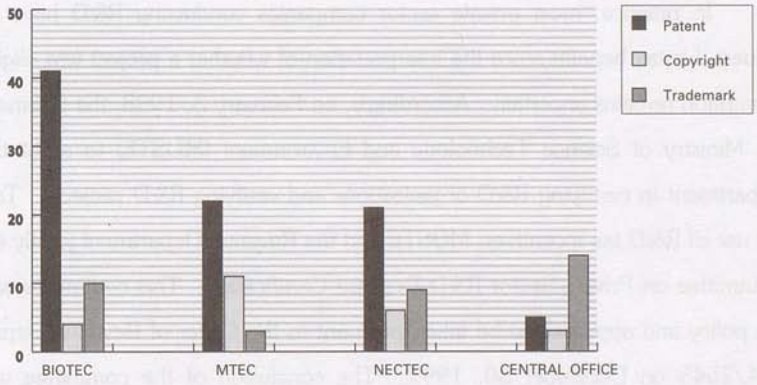
In 1999, NSTDA gave IPS the mandate to extend its services to private sector organizations requesting legal services to protect their intellectual property rights. In this role, IPS acts as an adviser and facilitator for undertaking all of the necessary processes relating to intellectual property protection. The initial service provided by IPS has been

widely appreciated by the private sector; 44 private companies have requested services and 91 applications have already been processed. NSTDA has taken the first step in supporting and enhancing intellectual property protection and strengthening the commercialization of intellectual property rights in Thailand.

The following table shows the various IPS services provided per year.

IPS Services	Unit	1992-5	1996	1997	1998	1999	2000	2001	2002 (MAY)	Total
Patents	Applications	10	2	7	3	11	14	24	18	89
Copyright	Applications		2	3	3	3	4	9		24
Trademarks Servicemarks	Applications		5	8	11			12		36
Integrated-circuit layout design	Applications						1			1
Patent searching	Applications		6	5	9	8	10	32	15	85
Seminars (Attendees)	Seminars			3(175)	1(50)	1(31)	4(648)	3(575)	1(156)	13(1635)
Private sector service	Applications					13	20	33	25	91

The graph below shows the number of IPS activities for NSTDA.



RDC - Research and Development Certification Committee

In a highly competitive domestic and international environment, research and development (R&D) activities are regarded as one of the crucial factors strengthening the efficiency of industrial competitiveness and leading to sustainable competitive advantages. Over the years, Thailand has gradually lost its competitive advantage, particularly labour advantages, and is becoming more expensive than its neighbouring countries. Limited and dwindling natural resources also put Thailand in a less position. Industrial restructuring, especially changing from a labour-based economy to a knowledge-based economy, is necessary to regain Thailand's competitive advantage. In a knowledge-based economy, it is technological R&D that is the main driving force of national development. As a result, the enhancement of R&D is desirable in all countries.

Thailand's government has recognized the importance of R&D and promoted it through various measures. One such measure is the encouragement of private sector investment in R&D. The Ministry of Finance enacted a Royal Decree, issued under the revenue code governing exemption from income taxes (No. 297) B.E. 2539, on July 15, 1996. This decree provides an incentive for private sector companies, including partnerships, to undertake R&D activities by providing tax exemption at an amount equal to 100 percent of the expenses incurred. In other words, R&D expenses may be deducted twice.

In practice, most private sector companies conducting R&D have hesitated to request this tax benefits since the interpretation of whether a project was eligible for such exemption remains uncertain. Accordingly, on February 3, 1998, the Cabinet authorized the Ministry of Science Technology and Environment (MOSTE) to assist the Revenue Department in certifying R&D organizations and verifying R&D projects. To encourage the use of R&D tax incentives, MOSTE and the Revenue Department jointly established a Committee on Private Sector R&D Expense Certification. This committee would set out the policy and approach to be taken pursuant to the Order of Revenue Department No. 584/2545 on December 30, 1999. The conclusion of the committee was that the National Science and Technology Development Agency (NSTDA) should be in charge of the verification and approval of R&D projects, which conclusion was officially endorsed by the Notification of the Revenue Department No. 103/2544 on February 5, 2001. To accomplish the efficiency and transparency of the certification process, NSTDA issued Order No. 072/2544 to set up the Research and Development Certification Committee (RDC) and the Office of RDC Secretariat on February 28, 2001. The main responsibilities

of RDC are to verify and certify R&D projects for tax incentive purpose and to provide, as requested by the Revenue Department, technical opinions related to the interpretation of R&D activities. In addition, the Office of RDC Secretariat has a duty to facilitate the operation of RDC. This mechanism is designed to stimulate and enhance the private sector to seek tax benefits in order to improve Thailand's international competitiveness.

From October 2001 to May 2002, RDC certified 17 projects valued at over baht 26 million. At present, there are 68 projects in process - valued at approximately baht 596 million. All R&D project applications may be classified as follows:

Type of Technology	Number of Projects	Amount (million baht)
Metal and materials	64	279
Electronics and computers	13	276
Genetic engineering and biotechnology	8	67
Total	**85**	**622**

ITAP's EVOLUTION

The role of ITAP has been reviewed as it evolves to meet the needs of a changing economy in the fast-paced, high-tech environment of the 21st century. For nearly a year, ITAP has examined its strategic directions for the next five years and systematically assessed the relevance and effectiveness of the program and determined current achievements and future opportunities.

NSTDA has long recognized the advantages of establishing international linkages with other agencies that are involved with developing the technological capabilities of SMEs. Such a linkage exists with the National Research Council of Canada's Industrial Research Assistance Program (NRC-IRAP) in the form of a joint agreement. The intent of this agreement is to utilize the experience and expertise of Canadian Industrial Technology Advisors (ITAs) in the development and implementation of ITAP.

NRC-IRAP was established in 1947 and is a long-standing and successful industry development program in support of SME technological innovation. Originally IRAP delivered its advisory/information service and its funding assistance separately; it wasn't until 1981 that these two elements were combined to form a single, powerful, problem-solving service. At the same time, a number of cost-sharing instruments or tools were developed to help SMEs with their developmental needs.

It has been IRAP's experience, in the context of industrial development, that it often takes the coordinated application of several instruments or tools and also time to develop a sustainable technological capability within an SME. Perhaps the most important operating criteria of IRAP have been the decentralization of much of the decision-making and the authority that is vested in its field network of ITAs.

NSTDA is developing ITAP to be the national technology support program in Thailand and achieve much of the same type of success that IRAP has, over many years, achieved in Canada. To assist with this development, two Canadian IRAP ITAs were assigned to work with NSTDA in Bangkok for one year. They are working on further defining ITAP, updating its strategic plan, and assembling the tools or programs that ITAP's ITAs can use to assist Thailand's SMEs. Most importantly, they will also be developing a training plan and training the Thai ITAs. These ITAs will deliver ITAP directly to SMEs and will be responsible for assisting companies in accessing the resources, expertise and information they need to increase their innovation capabilities.

ITAP will play a strategic role within the Thailand science & technology infrastruc-

ture. It focuses on innovation at the level of the individual SME and delivers its program through technically qualified and experienced staff. ITAP has found a unique and critical niche that is complementary to other science & technology programs across Thailand. ITAP will become an essential element of NSTDA's mandate by improving NSTDA's strategic position in the Thai innovation infrastructure thus increasing its capacity to support the SME community.

To address this opportunity, ITAP now has a new strategic plan that clearly defines its operational parameters:

Mandate: To stimulate the economic growth of Thailand through technological innovation.

Mission: To enhance the competitiveness of Thai SMEs through the innovative application of technology.

Vision: ITAP will become the national technology support program for SMEs to help them meet the challenges they face in introducing technology-based products and processes.

Values:
1 - Client Focus
2 - Excellence in Delivery
3 - Network

Objectives:
- To promote and support the development of SME technological Capability.
- To provide knowledge-based innovation assistance to SMEs.
- To provide national network access to strategic resources for the support of SME innovation activities.
- To promote the use of Thai expertise to address the technology needs of SMEs.
- To further develop international linkages that offer technology-based opportunities for SMEs.

ITAP's development strategy is based upon components and decision criteria designed to work in a flexible and responsive manner to support a variety of needs. Five support areas have been identified that form the work basis of ITAP by providing technical information and financial assistance to eligible SMEs. The support areas are:

- Introduction to Technology
- Information
- Core Technology Development
- Production Methods Development
- Research and Development

ITAP now exists as a toolbox of inter-related support methods to promote the progressive, technological development of SMEs. ITAP terms and conditions for SME eligibility and selection are flexible, responsive and broad in their application; entry into the program is selective and based upon an SME's potential for improving its technological innovation capability. ITAP has defined the following strategies to guide its evolution:

- Operate a national network of qualified, knowledgeable and experienced ITAs.
- Provide clients with access to relevant and up-to-date information and technology.
- Promote the use of technical personnel as agents of technical change for the client.
- Promote strategic linkages, alliances and partnerships.
- Introduce clients to the capabilities of the Thai innovation infrastructure.
- Invest in technologically innovative client.
- Foster an holistic approach to innovation.
- Foster strategic technology planning in clients.

As well as ITAP, the agreement and working arrangement between NSTDA and NRC proposes to create the Thailand Innovation Network (TIN) based upon the Canadian Technology Network (CTN) model. Like CTN, TIN will link government laboratories and agencies, post-secondary institutions, industry associations, technology centers and economic development agencies to provide Thai companies with access to expertise, advice and information about how to meet technology - related business challenges. TIN will link into CTN and in turn to the many networks that make up CTN. In an increasingly global economy these networks of networks will be a valuable resource for both Thai and Canadian companies.

ITAP's primary focus is to provide high quality and timely technical advice and assistance to SME clients - a one-stop contact point for a variety of program elements. ITAP will also offer funding where appropriate. This financial support will help the SME to alleviate the risk associated with the development or adoption of new technologies. It is this strategic mix of technical advice and support funding that facilitates the technology transfer process.

CONCLUSION

To be successful, a firm must innovate on all fronts, from R&D to business and human resources functions. Innovation is not limited to technology or to new product development, but, for ITAP to provide support for an SME, the SME's innovation must be of a technological nature. For ITAP, innovation is defined as any change of a technological nature that improves the competitiveness of a firm. This competitiveness could be expressed as cost reduction or revenue gain, improvement in internal efficiency, expanded market share, or new or improved products or processes.

In the industrial environment, individual acts of innovation are not enough, no matter how profitable. Companies need to develop the culture that will allow them to innovate, quickly, successfully, and repeatedly. The challenge facing Thai companies is not just how to innovate but, importantly, how to build innovative organizations that are capable of generating the constant stream of innovation necessary for sustained, competitive growth.

NSTDA has accepted this challenge and, in collaboration with NRC, is developing ITAP in order to foster the establishment and growth of the technology capabilities of Thailand's SMEs.

APPENDIX: STAFF

NAME	POSITION	BACKGROUND
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